

CIRCUIT RIDING Bally personnel were travelling around the country lately, visiting local distributors and dealers and showing off the PROGRAMMING KEYBOARD ( new name for the Add-On Keyboard ). They were in the West Coast area the last week of January, and I had the opportunity to attend a San Francisco presentation. They used the same pre-programmed 'slide show' as was used at Las Vegas, stored on a mini-floppy. They used a Micropolis reader. The Spec Sheet I had in the last issue has been upgraded to show 16K RAM resident in the Keyboard instead of the 4K. Also, the RS232 connector size was corrected to 25 pins. The official title of the basic machine is now VIDEO CONSOLE. A photograph of the combined units is included in this issue.

BALLY MANAGEMENT seems to be on the fence as to the timing for the production of the Keyboard. These meetings were to get dealer feedback, but it seems to me that regardless of market size, the longer it takes for the unit to appear, the less share will be realized by Bally. The specs are impressive, but people won't wait forever.

NEW GAMES in the mill. I saw prototypes of three new items which should be in production soon, plus heard a description of two more.

- 2007 PINBALL (25.) where a pinball machine table is laid out with action bumpers and 4 flippers (2 controllers used). The ball is about 2 pixels square, and bounces around as determined by the things it hits with various speeds.
- 2006 SPACE INVADERS (20.) where three rows of 'martians' flit back and forth in the air, dropping bombs on buildings on the surface. Your rocket launcher tries to shoot them all down before all your buildings are gone or they get you.
- DOGPATCH ( ) is a shoot-out between feuding families
- 4004 MUSIC I and II (50.) will project a staff on the screen and you can place notes (and sharps and flats) where you wish, use the trigger to fix the position, and develop music.
- 4003 ASTROLOGY (50) is being delayed as it seems to need more memory. They want to be able to 'travel' hundreds of years back and forth in time and show the heavens at those times.

APOLOGY IS DUE to over 40 subscribers who are patiently waiting for the literature mentioned last time. The service manual and software description have been backordered and will be sent to you as soon as possible.

LITERATURE HUNGRY? John Sweeney reminded me that the Bally Basic is based on Dr. Wang's Palo Alto Tiny Basic, and suggested the following sources of documentation:

Dr. Dobb's Journal of COMPUTER Callisthenics & Orthodontia had a number of articles in their first year of publication. The bound volume is available from People's Computer Company, Box E, Menlo Park, CA 94025 @\$13. plus 1.50 mail plus .78 Cal tax if required.

PCC's REFERENCE BOOK of PERSONAL and HOME COMPUTING, at \$5.95 plus .95 and 35¢ is available from the same source. It contains the source and object codes for the Tiny BASIC.

I found both volumes at the Santa Clara BYTE Shop locally. There is some duplication between volumes, but there is so much other material in each that it is worth having both.

8K ROM in some consoles appears as a single chip of 8K, and as 4 chips of 2K each in others. If one was really clever and had a good understanding of computer circuits, additional ROM could be inserted in the unused slots, but pc board wiring would have to be changed as all 4 sockets are wired in parallel.

DIVISION WITH DECIMALS is just in from Paul Law who says he modified a BYTE 2/79 program. N indicates the length of the decimal portion.

```
10 CLEAR                      80 PRINT Q,".",
20 PRINT " X ÷ Y = N"          90 X = (X-QxY)x10
30 INPUT "INPUT X" X           100 Q = X ÷ Y
40 INPUT "INPUT Y" Y           110 P = Q + 48
50 INPUT "INPUT N" N           120 TV = P
60 CLEAR                      130 N = N-1
70 Q = X ÷ Y                   140 IF N > 0 GOTO 90
```

PROGRAMS will be given more space in future issues - I think we've located most of the 'secrets' in the Bally units and we will be seeing more sophisticated games, etc. I am now considering two levels of programs: Free and Not Free.

FREE: Unless otherwise indicated, I will assume that programs sent to me are for the use of all subscribers, without compensation. This is for two reasons- 1) is fairness as we have as subscribers a number of persons who are employed as programmers, and they cannot sell their wares beyond their employers, and 2) is economics as I can't afford to pay for anything at these subscription prices. I will ask that all programs over a half page be sent on cassette, with a listing enclosed. That way I don't have to spend hobby time in loading a 3-4 page program and then figure out why it doesn't work. I will duplicate the cassette and return it. If a program is short, I will put it in the ARCADIAN, and if not, I'll add the subject to a list. If you want a program, it'll be custom taped and sent out at the cost of tape and postage. If you just want a listing, send a couple of stamps. More next time as I get some experience in this area.

NOT FREE: Some of you will develop programs that you will wish to charge for, and I will provide space for a note to that effect. I do not wish to become involved in any transaction. The first such item is from Mr. J.Taillefer, 115 Northwestern Ave. Ottawa, Ont. CAN, K1Y 0M1 who has: Enhanced versions of Lunar Lander, Gravity Game, and Player Piano, who asks for a C-30 tape and \$1.50 postage. He also has new games, and will send a list for 25¢ (no stamps unless they are Canadian.)

\$ sm,n,o or math routines will be expanded and explained in the next issue.

CUSTOM CHIP DATA may be made available late this year. While this is proprietary data between Bally and their chip manufacturers, the data can generally be obtained if you had the machinery/money to do it. This means that the competition can do it (from whom you want to hide it) but the average user is stumped (the guy who could use it and is supporting you). The sooner the user can get such data the more effectively he can use the overall capabilities. The game cartridges are no secret as certain of our subscribers are determining the object code listings as they are released.

PRINT A QUOTATION? It is difficult to ask Tiny BASIC to put a quoted statement in a program, such a SAY "HELLO", unless you know that items within an apostrophic pair will print as a string, therefore 10 PRINT 'SAY"HELLO' will do it.

ZGRASS ARTICLE that appeared in issue 2 came from "Computer Graphics a Quarterly Report of SIGGRAPH-ACM, Vol 12 No 3, Aug 1978". This translates to the Special Interest Group-computer GRAPHics - Association for Computing Machinery. 1133 Avenue of the Americas, New York NY 10036.

HACKERS MANUAL by Bally is in the works. A more detailed volume to tell us how to use the machine is actually being written. I'll keep you informed as to its printing, availability, etc.

PRICES of the Video Console are now listed at 329. for the 4 handle unit and 299 for the 2 handle job (now in a white container)

CALL does not need parentheses around the called address. Here are a couple of unusual ones: CALL 4910 brings up CHECKMATE and plays 10 games in the 0 player mode. CALL 5585 plays 87 games. CALL 4920 does the same thing in other machines, and gets GUNFIGHT with CALL 6938 on those machines, says Carl Meyer.

FUTURE of the Keyboard has been questioned because of recent publicity in some of the trade papers. These are in error- it is the full-size pinball machine that Bally expects to phase out of production.

INTERESTING AREAS for people to work on, recently suggested by Stan Klein, are:

Scientific Simulations (such as gravity in Lunar Lander)

Video Display for psychology experiments.

Also, some of our subscribers are teachers, and wonder if any programs are being developed with student applications.

"GAME OVER" characters were mentioned in #3 as being available by the command CALL(3164). This command locks up the keypad and you can't get out except by a RESET. We now have a more practical way to do it, leaving the keyboard fully operational so that you can continue a game after the words show up. The following program, developed by Tom Wood, executes a special routine to pull out the 'preprinted' statement.

10 A=20180;B=A;C=80	IF your machine does not
20 X=-43; GOSUB C	print the whole phrase,
30 X=12341; GOSUB C	substitute 3159 in line
40 X=19480; GOSUB C	50. This is indicative
50 X=3164; GOSUB C	of at least two variations
60 X=-13871; GOSUB C	in Bally software in the
70 CALL(B); STOP	field. That is , the
80 %(A)=X;A=A+2;RETURN	location of certain

object codes in the 8K ROM of the Video Console are not identical in all machines.

For those interested, the following is a listing of the routine:

4ED4:	D5	PUSH	DE	Save BASIC pointer
4ED5:	FF	RST	38H	Call subroutine
4ED6:	35	DB	53	SR no. 52, load regs.
4ED7:	30	DB	48	Horizontal screen position
4ED8:	18	DB	24	Vertical screen position
4ED9:	4C	DB	1140	Color and size
4EDA:	5C 0C	DW	0C5CH	Adrs of message to display
4EDB:	D1	POP	DE	Restore BASIC pointer
4EDC:	C9	RET		Go back to BASIC

The strange decimal numbers used in the BASIC statements arise due to an idiosyncrasy of 8080/280 Microprocessors and the way BALLY BASIC handles integers. BALLY BASIC uses 15 bit signed integers and stores data into memory with the least significant 8 bits going into the lowest numbered memory location. With these two things in mind we can see that machine-level routines must be POKED into memory 2 bytes at a time, after reversing the bytes and converting to decimal. As an example, consider the first two bytes of the above routine (D5 and FF). The order of these two bytes must be reversed, the two bytes considered as one signed integer and converted to decimal. Thus FFD5 becomes -43 decimal and shows up as line 20 in the BASIC language routine. Continuing,  
 3035 = 12341  
 4C18 = 19480  
 0C5C = 3164  
 C9D1 = -13871 (C = 1100 which has the sign bit set)

MONITORING of external functions can be done with the Arcade - that is, it will determine the status of no/off switches that are located away from the machine. This can be used in a practical sense to review a process (a rise in liquid level, or elevation of temperature might close a switch) or status (is a window open?). This is accomplished by using the hand controller ports. What we have to do is plug in our own RS232 connector that is attached to the various switches, and fool the Arcade into thinking that our hardware is the handcontroller. Each controller has 5 switches, TR, JX=-1, JX=+1, JY=-1, JY=+1; plus the knob potentiometer, KN.

a. RS232 connector. Fig 1 shows the identity of the nine pins of the connector. No connection to pin 1. The pins are marked on most plugs. The controller switches and knob are connected as shown in Figures 2 & 3.  
b. Switches. The program in the computer is a simple loop, asking if the contact is closed. If so, it goes on to tell you something.

```
10 IF TR(1)=1 GOTO 30      Modify this for the other
20 GOTO 10                 four commands.
```

```
30 PRINT "SWITCH 1 IS ON"
```

c. Knob. Modify line 10 IF KN(1)= N GOTO 30. The value of N will come later. The circuit for a knob is shown in Fig. 3. All of this should be duplicated for each switch desired. The potentiometer will allow you to put a number of switches on the same line as each would have a different pot. setting as shown later. A total circuit could be that of Fig. 4. Set pot A and close the switch. Ask the machine to PRINT KN(1), and get a value, say -143. This would be the value of N in the line 10 shown above. By repeating this procedure for all the pots, you can see that as each switch is closed, it can be identified because it has a unique KN value. Theoretically you could have 256 switches, but because of various uncertainties, there should be 10 digits between KN values. The line 10 command should also accommodate this variability by becoming 10 IF KN(1)>=148 IF KN(1)<=-138 GO TO ...

CONTROL is the problem I now have - to get the machine to turn on some external device, such as a relay, etc.,. I received one suggestion that is unique: Have the screen dark, and have the receipt of a switch closure create a small BOX at some location on the screen. Put a photoelectric cell there, glued on the screen, and connected to a relay circuit. If you had enough of these, the screen would be like a porcupine.

The above discussion was triggered by a question from Jim Unroe about security systems, and wiring data was received from Stu Haight. The cutaway drawings were received from Dick Belton.

By building a little logic program, three or more switches can be cascaded and connected to a simple calculator keyboard (surplus) and made into a push button lock affair. Fig. 5

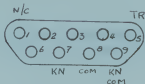


FIG. 1

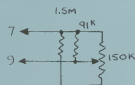


FIG. 3



FIG-2



FIG. 4

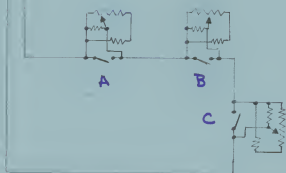


FIG. 5

```

10 IF JX(1)=-1 GOTO 30
20 GOTO 10
30 IF JY(1)=-1 GOTO 50
40 GOTO 30
50 IF JX(1)=1 GOTO 70
60 GOTO 50
70 PRINT "COMBINATION WAS 8,4,6"

```

#### TAPE SOURCES in this area are:

MICROSETTE Co. 777 Palomar Ave Sunnyvale CA 94086 who provide a C-10 (that is, 50 feet) at \$7.50 per 10 postpaid.

MJS MAGNETIC TAPE PRODUCTS 2514 Seaboard Ave., San Jose, CA 95131 will precut tapes to any length from one minute to two hours, with a 25 tape minimum.

STANFORD INTERNATIONAL Box 609 San Carlos CA 94070 is one that I have purchased audio-quality tape from, and have had good success.

Write for catalogs from these, and if you have any other sources, pass them along.

CANADIAN SUBSCRIBERS, and others who can get ELECTRONICS TODAY, found 'BALLY ARCADE: Game or Computer' as the cover feature in the 11/78 issue. A good 6-page in-depth review included photos of the insides of the TBASIC cartridge, the motherboard of the Arcade, and the hand controller.

MORE MEMORY? Yes, you can add more memory to the Console, but only by going into the 50pin connector and possibly the pc board. This would not be a job for the neophyte, and is beyond my capability to explain. Power may be a thing to consider. However, if you have the knowhow, Bally says it could be done.

DIRECT INTERCONNECTION between two machines is being worked on by Jim Unroe. He has developed a program where one machine can talk to another via a pair of cassette interfaces. He has one program for each machine with interactive operations. I'll be reviewing these and hope to report on it next time.

# We're serious about fun and games.

Consumer

## Bally computer uses plain language

Fearing that few people will actively want to program their home computers, the makers of these machines are turning to simpler software packages. But whereas many personal computers use some form of Basic, Bally Corp. is coming out with a custom language that uses words instead of letter-number combinations to make it seem friendlier.

Introduced at this month's Consumer Electronics Show in Las Vegas, the new language also has a more glamorous pedigree than most software, being an offshoot of the language used to create special

computer effects in the movie "Star Wars." Called Grafix, the self-teaching, user-expandable language is to be a major feature of Bally's Level III home computer when it hits the market during the third quarter. The firm previously introduced a Level I computer that operates with read-only memory cartridges containing video games.

Creative. Basic's mnemonics and typical programming-like syntax, such as HLIN for horizontal line and VLIN for vertical line, could confuse potential users. Instead, the Level III program allows users to create graphics by using words like "circle" and "box," according to Robert Wiles, general manager of the Franklin Park, Ill., company's Consumer Products division.

When a user is uncertain how to specify a figure, its position, or its color, he or she can type in "help," and the computer will begin a sequence of directives that show the proper method.

Users add new words to the Grafix vocabulary simply by programming graphics subroutines and then naming them. In this way, the language can be expanded to the limits of available memory. At present, the system contains 32 kilobytes of read-only memory and 20 kilobytes of

Reprints of some recently published material.

Received four or five copies of the Electronics article, thanks.

Some corporate words to sales-oriented readers.

random-access memory, and provisions exist for adding memory accessories later, according to Wiles.

Grafix was developed by a team of programming engineers led by Tom DeFanti, professor of computer sciences at the University of Illinois, who created the software for "Star Wars." The language is loaded into Level III from a software cassette. Whereas Bally's Z80-based computer can interface to a black-and-white television set or monitor, it is best to attach it to a color set in order to make full use of its 256-color capability.

A Level III computer is built by adding the special programming keyboard and Grafix software to Bally's Level I video console. The \$300 video console is available now, and the \$650 keyboard and software cassettes will be ready during the summer, Wiles says. □

At Bally, we're in the business of helping people have fun. Since we introduced our first wooden pinball game in 1931, we've become the world's leading producer of coin-operated amusement and gaming equipment. And along the way, we became the first U.S. manufacturer to use integrated electronics in our complete line of pinball games.

But Bally is helping people have fun in more ways than that. For the past few years, we've been entering new areas of growth and expansion. As an operator of 109 Aladdin's Castle arcade amusement centers. As a major manufacturer of home pinball machines and electronic TV games. And as the owner of a 9-acre tract at the intersection of Boardwalk and Park Place in Atlantic City, where we'll build a luxury hotel-resort-casino.

Of course, we're not only making fun for consumers. We're also bringing smiles to our stockholders. In 10 years, we've grown from sales of \$30 million to \$245 million in 1977—up 18% over 1976. Our 1977 earnings of \$19 million—up 59% over 1976 levels—set a new record. Most importantly, our return on average shareholders' equity in 1977 was 21%... putting Bally in the top tier in this regard among all major U.S. corporations.

Our employees are happy, too. We now provide jobs for some 5,000 people at 19 plants and offices in the U.S. and overseas.

Our changing product mix includes electronic components that we manufacture and supply for other makers of commercial and consumer products, both in and outside the amusement industry. And that makes both our suppliers and our customers happy.

Through our diversification, expansion and growth—and achievement of record revenues and earnings—our management also has much to be pleased with.

At Bally, it's fun being serious about fun and games.

*Bally.*

Manufacturing Corporation  
2640 West Belmont Avenue  
Chicago, Illinois 60618





Bally COMPUTER SYSTEM VIDEO CONSOLE AND PROGRAMMING KEYBOARD

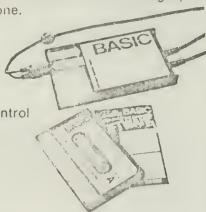
#### MUNDANE ITEMS for the back page:

• You will note a change in page numbering. Since a subscription is to an annual volume on a Nov to Oct basis, the page numbering should be consistent. Issues 1 to 3 contained the first 22 pages for this volume.

• The RS-232 connector mentioned last time turns out to be salvage Bally connectors with cable. Apparently scrapped because of improper wire color coding, but certainly adequate for our experimental purposes.

## Audio Tape Control

With the Bally BASIC audio cassette interface accessory you can store programs on audio tape, play Bally software cassettes and exchange programs over the phone.



The following control words are used to store and play back programs.

:PRINT;LIST records program from computer memory to audio tape

:INPUT plays back program from audio tape into computer memory as listing shows on TV screen

:RETURN turns off audio cassette interface after program has been loaded into computer memory.

:LIST plays back program listing to TV screen only—not into memory.

For more information about the latest Bally BASIC software and accessories, see your Bally dealer or write:

Bally BASIC  
Bally Consumer Products Division  
10750 West Grand Ave. Franklin Park, Ill. 60131

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## Keypad Inputs

**CHECK**  
While running a program you can check to see if a key has been pressed on the keypad.

EXAMPLE:

```
10 IF &(22)=4 PRINT "5"  
20 GOTO 10
```

**WAIT**

When you want your program to wait for a key to be pressed use the KP command. To see the numbers assigned to each key use this program.

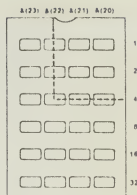
```
10 A=KP  
20 PRINT A  
30 GOTO 10
```

## Music Synthesizer

Setting these registers to a value between 0 and 255 allows you to control the music synthesizer module. For example: &(23) 255,&(21)=255 sounds like a rocket

&(16) master oscillator	&(20) Vibrato
&(17) oscillator A	&(21) Noise control $\times 16 + \text{vol C}$
&(18) oscillator B	&(22) Volume B $\times 16 + \text{vol A}$
&(19) oscillator C	&(23) Noise volume

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## ARCADIAN

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FIRST CLASS